SOIL CONSERVATION DIGEST

CALIFORNIA-NEVADA REGION

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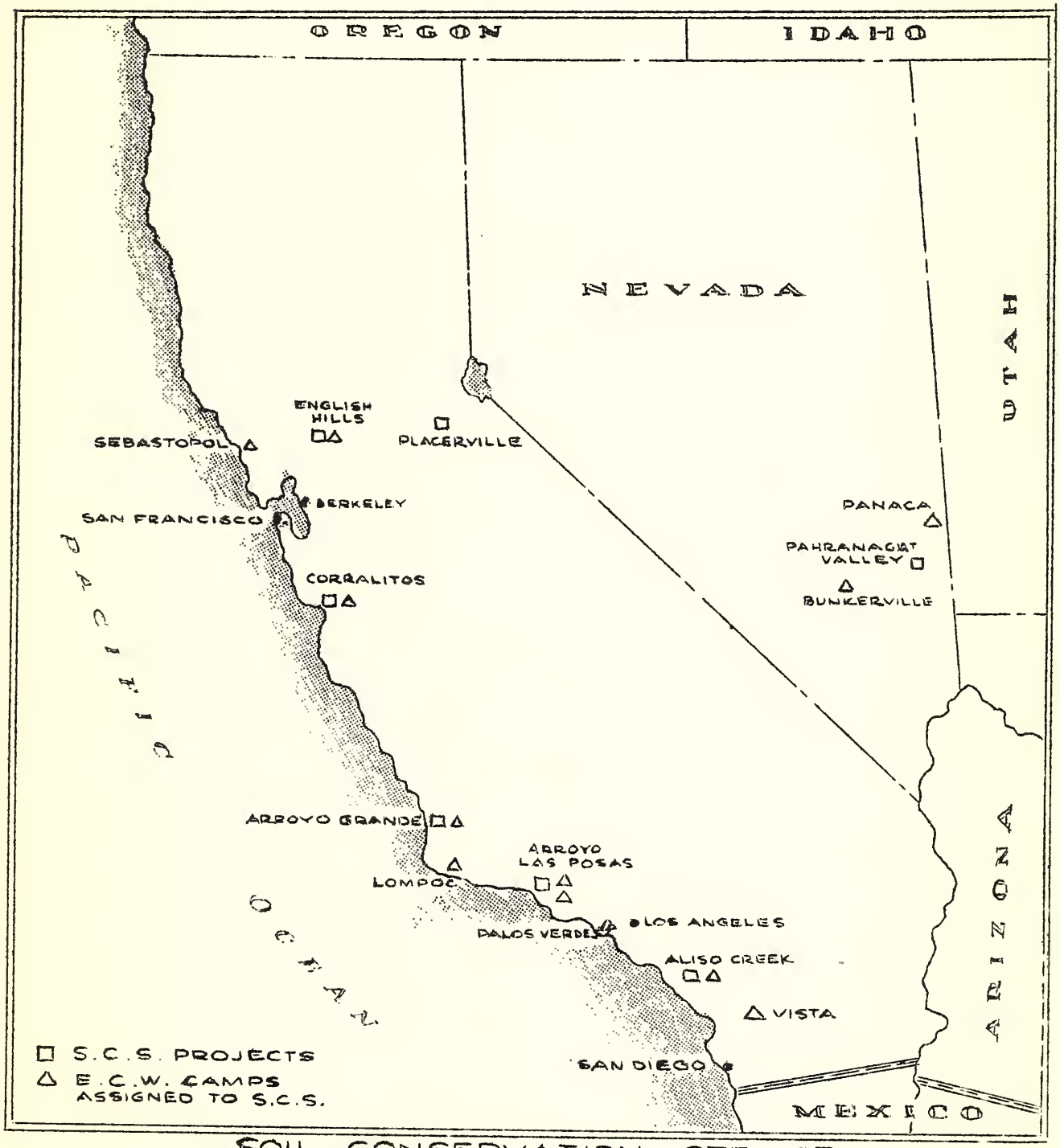

SOIL CONSERVATION SERVICE
U.S. DEPT. OF AGRICULTURE

SOIL CONSERVATION DIGEST* CALIFORNIA-NEVADA REGION
(*Formerly California Erosion Digest)

Soil Conservation Service U.S. Department of Agriculture
(Issued monthly at the Regional
Office, Santa Paula, California)

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H. H. BENNETT, CHIEF OF THE SOIL CONSERVATION SERVICE, VISITS CALIFORNIA PROJECTS. GIVES TALK BEFORE SCS STAFF AT SANTA PAULA

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In an informal talk before the staff of the Soil Conservation Service at Santa Paula the third of this month, H. H. Bennett, Chief of the Service, stated that he was highly pleased with the progress shown in soil conservation work throughout California. Mr. Bennett, accompanied by D. S. Myer, Head of the Division of Cooperative Relations and Information for the SCS, made a tour of western soil conservation projects in Colorado, Washington, Oregon, California, New Mexico, and Arizona.

Mr. Bennett was greatly impressed by the magnitude of the soil erosion problem in this state. In the Corralitos area, near Watsonville, he was shown a ditch three miles long where there were twelve definite types of erosion control being used. He said that his first impression was that it was a rather expensive undertaking but that when he was told this one ditch was the base of the erosion control problem for 500 acres of land, valued at $400 per acre, he saw the profitableness of the investment.

He pointed out that the erosion problem affecting a number of regions in California was more severe and much more rapid in development than in most parts of the country, due to the intensity of precipitation and to the steep pitching watersheds. He stated further that this condition was partly nullified by the fact that many of the orchardists in various parts of the state have developed erosion control practices to a high degree of efficiency.

Mr. Bennett highly complimented Director Harry E. Reddick upon the efficiency of his organization in attacking the problem of soil erosion that in many places is more severe and more greatly influenced by climate, slope, and soil, than in most other parts of the nation.

Referring to the future of soil conservation in this country Mr. Bennett emphasized the fact that the work must go on. "It is not a question of whether we want to do it or not; obviously we shall have to do it." He stated that one of the peculiar problems confronting the Service was the discovery and adaptation of suitable plants to hold the soil. He cited one instance where there is a definite and critical demand for thousands of pounds of slender wheat grass, a native of the Pacific Northwest. At the

present time the seed is not available and will not be for several years.

In closing he stated that he was tremendously pleased with the helpful cooperation being received from local citizens and from the agricultural specialists of the University of California.

PROPAGATION PROBLEMS

Oswald K. Hoglund, Superintendent
Nurseries Division, Santa Paula, California

Native California plants, or those long-established in this state, are being used almost exclusively for the vegetative control of soil erosion in this region. Familiarity with the seeding and growth habits, adaptations, and general ecology of these plants is necessary, not only for evaluating their use for erosion control, but also is helpful to their successful propagation in the nursery. All of these plants are more or less drought-resistant. Under natural conditions their period of most rapid growth is in the spring and very early summer, following the winter rains. They then undergo a prolonged dry season in which they are relatively dormant. An outstanding characteristic of these plants is their ability, as tiny seedlings, to send roots deep into the soil, to keep pace with the rapidly receding soil moisture, a factor that is very important in enabling them to survive their first season of drought.

Perhaps the most successful way to propagate these drought-resistant species would be to simulate the natural conditions, but on a modified scale. This would best be accomplished by starting them in early spring, in open soil watered to its full moisture holding capacity until a good stand was secured, then permitting the deeply penetrating roots to follow the moisture down during the summer. Thus, an ideal "natural" season would be provided artificially, and a plant with an adequate root system for planting under natural conditions would result.

The requirement of hundreds of thousands of these plants for soil erosion control, however, does not permit of such a method of propagation. In the first place, many of the species which we are using in very large quantities, such as the Eucalypts, the Rhuses, Toyon, etc., are evergreen, and cannot be transplanted from nursery to permanent planting by the bare-root method with any expectation of a high survival under California conditions. Also, it would be impracticable to attempt to keep soil around each individual plant, if dug from nursery rows. The only alternative, therefore, is to grow these plants in containers.

One of the problems that arises from growing these plants in containers is that they must be treated very differently from what occurs under natural conditions. In the containers they must be watered frequently all summer, which tends to force them into a succulent, "soft" or "green" growth,

instead of the slower growth which, under natural conditions, enables them to establish themselves in competition with other plants. The danger, therefore, is that too tender a plant may be produced in the nursery. The plants must necessarily be grown under lath, as it would not be possible to water them adequately in containers placed outside in the open, on account of the small space in which the roots are confined. The most important factor that makes it possible to grow these native plants under lath and expect them to succeed after transplanting to the open is that the transplanting will be done in the winter, the season of short days, diminished sunshine, and abundance of moisture from rainfall, during which period they can become established and gradually adjust themselves to the longer, warmer days of spring. An additional important factor affecting ultimate survival is the care that is being taken in planting, which includes removal of competing weed growth from around the plant, planting in depressions or small basins to catch rain water, mulching, and, in some cases, watering artificially where needed. The type of winter and early spring weather that is encountered, together with care in planting, therefore, will largely determine the percentage of survival.

One precaution is to grow the plant in as deep a container as practicable, taking into consideration such facilities as type of labor available for transplanting, character of soil into which they are to be planted, etc. Generally speaking, the longer the roots, when the plants are planted outdoors, the better will be the chance of their surviving as the soil moisture lowers after the winter rains. This argues in favor of very deep containers. At the same time, there is a necessary limitation on depth of containers from the standpoint of handling tens of thousands of plants economically. The real problem is to strike a balance between the type of plant that can be grown at least expense in the nursery, that can be transplanted economically, and at the same time one that will insure the highest possible survival.

The response of plants to all nursery practices such as transplanting from seedling flats into containers, response to shade, to behavior in containers, to the influence of paper pots as compared to open soil, to watering, to various seedling diseases, etc., is different with each species. With the average run of plants, which have been handled in commercial nurseries for many years, these responses are known and experience has taught the nurserymen how to handle them. But with most of the native plants these are still unknown factors, and methods of propagation and handling remain to be worked out.

The recognized importance of these native plants for soil erosion control provides the incentive, not only for working out methods of propagation, but also for acquiring all information obtainable concerning them, including their ecological relations, time and habit of seeding, seed treatment, germination powers, weight of seeds, and the resting period of the seed. Such information is being brought together by the Nurseries Division.

HAROLD WAHLBERG, FARM ADVISOR FOR ORANGE COUNTY, CITES BENEFITS OF SOIL CONSERVATION PROGRAM

(From Long Beach, Press-Telegram, Saturday, September 21, 1935)

"Orange County will benefit in many ways by the recent establishment of the Soil Erosion Control Demonstration project in the El Toro district, about nine miles east of Santa Ana, according to Farm Advisor Harold E. Wahlberg.

The soil conservation and erosion control program which will be inaugurated in the area by the Federal Government will save and build up soils for permanent agriculture that are now being removed gradually by every storm that frequents the district, he said. This will mean insurance for better crops and income to the seventy-five properties co-operating, and will in turn be felt by the whole county.

The project also furnishes a practical work project which will provide labor for over 400 men, drawn largely from Orange County sources; $110,000 has been appropriated for this year's quota of labor and materials for the project.

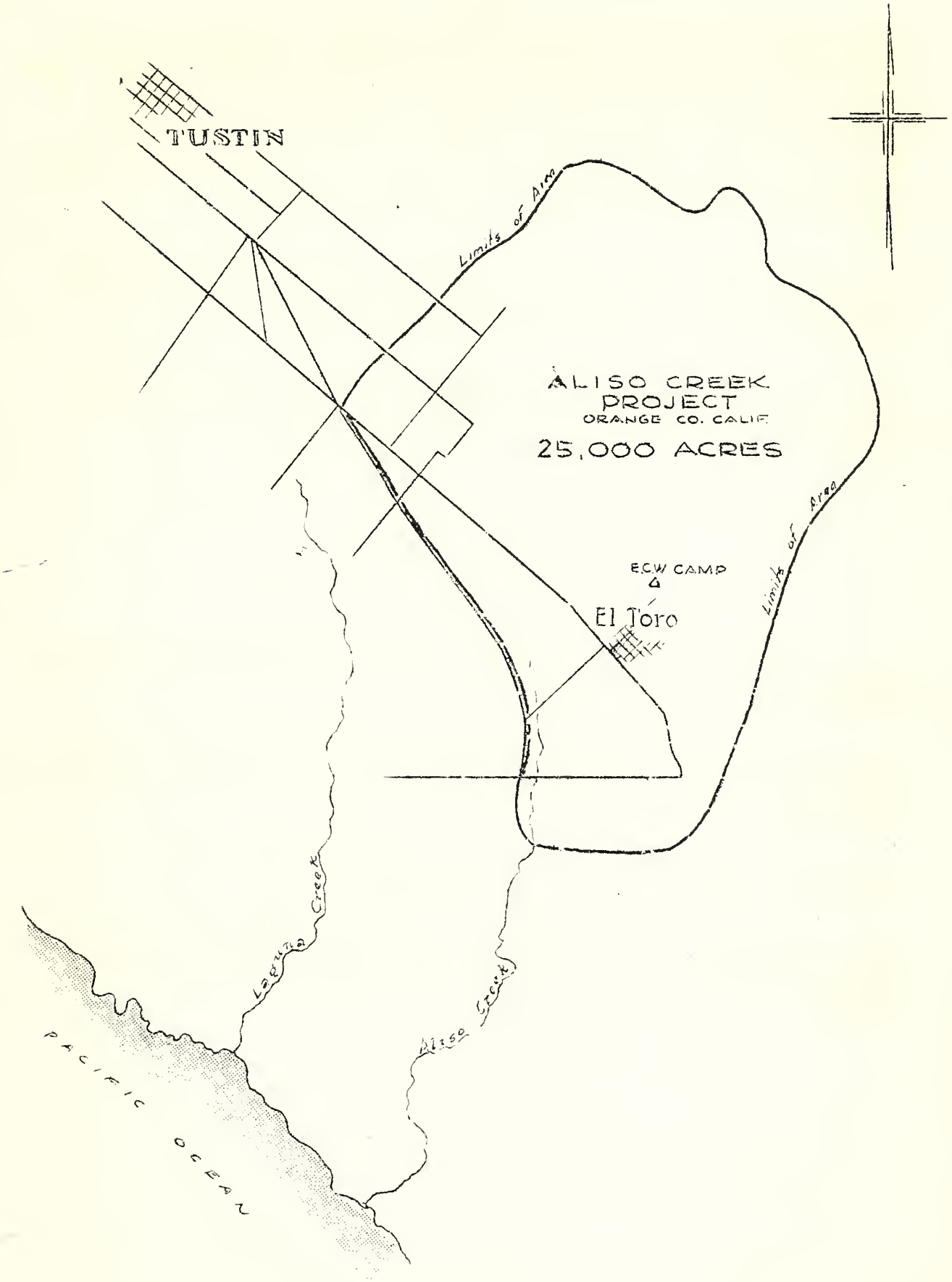
The local project embraces 25,000 acres devoted to the growing of beans, grain and orchards.

A demonstration project usually consists of all the land within a watershed -- all the land lying within the drainage basin of a given stream. In this case Aliso Creek. Each of these areas is selected with careful consideration of its adaptability to an effective demonstration and its availability for inspection by a large number of farmers. The land comprising a project area must have erosion problems that are representative of the entire surrounding countryside. If sheet erosion is prevalent in a region, the project must be able to demonstrate how sheet erosion can be halted. If gullies are numerous, the project must be able to show how gullies can be controlled.

The farmers of a project area enter into contracts with the Government whereby they agree to operate their farms under guidance of the Soil Conservation Service, furnish as much labor and material as possible to put the program under way, and maintain for a five-year period the cropping plans and erosion-control structures installed by the Service. In return the Service agrees to lay out a complete erosion-control program for each farm, supervise the work, and furnish whatever supplementary labor and material is needed to do a complete job.

Farmers and landowners in the neighboring countryside, outside the demonstration area, are asked to come and inspect the erosion control work that is being done. They are shown by actual concrete example that it is both possible and practical to halt the inroads of erosion on the fertility, even the physical substance, of their fields.

The factors besides the above that influenced the location of the


TUSTIN
Limits of Area
ALISO CREEK
PROJECT
ORANGE CO. CALIF.
25,000 ACRES
E.C.W. CAMP
El Toro
Limits of Area
Laguna Creek
Aliso Creek
PACIFIC OCEAN

demonstration project here were that Orange County is the third county in total value of agricultural production in the United States; the area is located in the geographical center of Southern California; it is contiguous to an area of highest agricultural land values --- citrus, walnuts, avocados, beans, and grain; Orange County has 6400 farms and a population of over 120,000 people; the project is located on the main 101 State Highway between Los Angeles and San Diego; assured of the strongest co-operation from property owners as well as county and farmers' organizations.

The land owners' committee which has represented the interests of the property owners of the area in negotiations with the Federal Soil Conservation Service is headed by Ben Osterman, El Toro. Other members are Raymond Prothero, Harvey Bennett, and Roy Browning.

General supervision of the project is under Harry E. Reddick, regional director at headquarters office in Santa Paula. Walter W. Bauer is superintendent of the camp at El Toro; Captain William M. Thomas is camp commander in charge of the CCC men enrolled at El Toro."

FORM EROSION ASSOCIATION

(From the Lompoc Record, October 11, 1935)

"Organization of the Lompoc Buellton Soil Conservation Association took place Monday evening at a meeting of about thirty farmers and local businessmen at the Lompoc CCC camp.

"Temporary officers named were: Robert E. Sudden, president; Guy Hibbits, vice-president; Howard Hutton, treasurer; Carl McCabe, secretary, and R. R. McGregor, director. These five will constitute a temporary board of directors.

"Adoption of By-laws took place, similar to that published in the Record last week. Dues were set at $2 annually.

"The territory wherein the new association will function was set forth as the district between the east city limits of Lompoc and the state highway at Buellton, bordered on north and south by the Natural watershed divide."

A WORD ABOUT PASTURES

Albert F. Sander, Jr. Agronomist
Agronomy Division

The characteristic long, hot, dry summer season of California has again left its usual effect upon the forage of our pastures and range lands. A large portion of the grazing lands are dry and practically bare of vegetative cover due to the continual search of livestock for green feed. The barren condition of the lands leaves them highly susceptible to incipient erosion by the heavy winter rains. Many pasture lands, situated on moderately high exposed slopes with a relative shallow infertile surface soil, consisting largely of light to medium textures, support a heavy growth of coarse stalked weeds which lend little assistance toward holding the soil in place. Some of these same lands once supported a complete cover of grass or timber. As the agriculture of this state expanded, more land was cleared and broken to make room for additional cultivated crops. Later, however, as the fertility and organic content of those soils became depleted their production was proportionately decreased. Due to lowered production and economic conditions, large areas were allowed to remain uncultivated and reverted to pasture lands used for grazing purposes.

Grazing lands located at higher elevations, bordering the timber line, still furnish a rather complete grass cover of considerable forage value. In these areas the vegetative cover consists largely of annual weedy grass types; such as Rat's tail fescue (Festuca myuros), Rip-gut (Bromus rigidus), Foxtail chess (Bromus rubens), and Wild oats, associated with alfileria, (Erodium spp.), Bur clover (Medicago hispida), and some species of annual clovers. These species are usually termed drought-escaping plants due to their early maturity and reproduction of seed before the available soil moisture has been exhausted. Continual and excessive grazing prevents the more valuable sparsely distributed perennial grasses from developing and later reproducing themselves. Pasture and range surveys indicate that these grasses, such as Needle grass (Stipa spps.), California oat-grass (Danthonia spps.), Malpais grass (Poa scabrella), Melic grass (Melica spps.), Mountain June grass (Koeleria cristata), Indian rice grass (Oryzopsis hyminoides) and fescues (Festuca spp.) occur in the more protected places as survivals of the predominate type of the original grass covering of earlier days.

We are now approaching the season of fall and winter rains at which time the present vegetative cover and the improvement of this cover is of great importance since the extent and intensity of erosion is influenced very largely by the type and quality of the vegetative cover. There are three methods of improvement and re-establishment of a vegetative cover for grazing and erosion prevention; the re-establishment of native grasses through deferred, closed or rotated grazing, permitting natural reseeding. Another method is the collection of native grass seeds and their production by planting in seed increase fields to later supplement, through artificial seeding, the natural reseeding process, and the seeding of suitable cultivated commercial grasses.

Since the period most applicable for practicing closed or deferred grazing has passed, and since sources of native grass seeds are not obtain-

able in sufficient quantities for general use, seeding with suitable cultivated commercial grasses is the only method open at this season of the year. Range and pasture improvement, through seeding of cultivated grasses, as reflected by the results of various range investigations, is limited essentially to moist grass lands where the annual precipitation is relatively heavy. Fortunately, the pasture lands within the areas of the Soil Conservation Service projects in California are, in the main, located in elevations where the annual precipitation is sufficiently heavy to provide the necessary moisture supply.

Where cultural operations may be carried on successfully in the preparation of a firm seedbed in advance of seeding, a better stand of vegetative cover may be obtained; but where the type of topography prevents cultural operations and is inducive to soil washing in the form of sheet or gully erosion, these practices should be discontinued. Disturbing the surface soil by plowing or discing on steep hillsides destroys weedy stubble which, if left undisturbed, would protect the young grass seedlings from being washed out by heavy rains. Where there is a vegetative cover consisting of dense, tall weeds and other types of plant growth that interferes with seeding operations, it is advisable to drag the land, using a flat harrow, heavy chain, or wood timbers to break down this growth before beginning seeding operations.

On some of the more badly eroded areas, it is highly desirable that some form of commercial fertilizer carrying nitrogen be broadcast before seeding, at the rate of 100 to 250 pounds per acre. This type of fertilizer will aid in increasing the rate of growth of the young seedlings and will provide a better vegetative covering before heavier rains begin, and will produce a more valuable forage crop.

Small fields (less than 10 acres) may be seeded broadcast by hand or with a suitable hand broadcaster, sowing the entire area. Fields over 10 acres in size may, also, very economically be re-established by seeding twenty-five foot strips from fifty to one hundred feet apart. These strips should extend across the area at right angles to the slope.

After seeding, the area should be gone over with a harrow to cover the seed, but using some care in preventing the seeds being covered too deeply. Germination tests indicate that a covering of one-half inch or less is most desirable.

Stock should be kept off the pasture until the growth is well established. If grazing is not restricted the young seedlings may be severely injured through trampling, or destroyed, since they can be pulled out of the ground very readily.

Western rye grass (Lolium multiflorum) is a short-lived perennial bunch grass, lasting from one to three years. It is a grass well adapted and especially suited to grazing lands in the cool moist coastal region where it occurs abundantly along roadsides, waste places and in cultivated fields. Under California conditions, Western rye grass produces seed abundantly, a factor which enables it to reseed areas very readily. The seeds germinate

readily, producing a good stand of excellent forage soon after seeding. Because of its ability to germinate rapidly and begin growth early in the spring Western rye grass is of special value when used in a mixture with slow-growing perennials. When seeding alone, 40 pounds per acre should be used.

Perennial or English rye grass (Lolium perenne) resembles Western rye grass but produces a shorter, finer top growth, free of bearded seeds and much longer-lived. While English rye grass is adapted to about the same conditions and use as Western rye grass, it is better suited to withstand drought conditions on high sandy slopes. In the lower regions, especially near the coast, English rye grass is very susceptible to rust. Thirty to thirty-five pounds per acre are used when seeding alone.

Orchard grass (Dactylis glomerata) is a long-lived, deep-rooted perennial bunch grass. This grass is well adapted to heavy moist soils and particularly to shaded areas where the wooded cover is not of too great a density. An excellent stand of palatable forage is produced under average coast conditions, but under very favorable conditions heavy tufts are produced which give rise to rather coarse, woody seed stalks of low forage value. Because of its distinct bunch type of growth, it should be used in mixtures along with finer, better sod-forming grasses. Orchard grass grows rather slowly in its early stages but begins growth early in the spring. Twenty-five to thirty pounds of seed per acre is desirable when seeding alone, as the thick stand will result in a finer quality of forage.

Meadow fescue (Festuca elatior) is a long-lived, coarse growing perennial bunch grass, of better sod-forming habit than Orchard grass. It requires moist conditions but will withstand considerable drought on the heavier soil types. Meadow fescue begins growth early in the spring and continues to produce palatable foliage until late in the season. Like Orchard grass it grows rather slowly in its early stages and is better adapted for sowing in mixtures. For seeding alone, 30 pounds to the acre will produce an excellent cover.

Redtop (Agrostis alba) is an excellent shallow-rooted, fine stemmed, sod-forming perennial. While it is essentially a plant of moist heavy soils, it will grow under a relatively wide range of conditions. On light sandy soils it offers little competition to other grasses better adapted to these conditions in the production of forage and erosion preventing coverage. It is particularly well adapted to wet, acid soils where conditions are less favorable to many other cultivated grasses. Under favorable conditions it is easily established producing a rapid growth, and is an excellent soil binder due to its sod-forming habits. Redtop is best adapted to seeding in mixtures, using four pounds to the acre.

Crested wheat grass (Agropyron cristatum) is a long-lived, deep-rooted, drought-resistant bunch grass, adapted to a wide range of soil types. Favorable results have been observed where it was seeded on light, dry, sandy soil, clay loam and sandy loam soils found on projects of the Soil Conservation Service. Despite its bunch growth habit, crested wheat grass has a tendency to be sod-forming due to the many small tufts which it produces. The foliage produced consists of numerous fine stems and leaves which remain

green until maturity. Early spring growth begins about two weeks in advance of other grasses. The extreme drought-resistance of crested wheat grass, coupled with its early growth, fine foliage and high palatability, makes this grass one of our most promising pasture grasses. Crested wheat grass is best adapted for seeding alone at the rate of 15 to 20 pounds per acre.

Smooth brome grass (Bromus inermis) is a long-lived, drought-resistant sod-forming perennial. It is a grass best adapted to the mid-western states where summer rains occur, but tests conducted within the Soil Conservation Service project areas indicate favorable possibilities in this region. It is adapted to a wide range of soil types and is suggested for use on the light sandy soils, providing some form of fertilizer is used. The strong rootstock habit of growth enables Smooth brome to produce a good cover under drought conditions on soils that are not too shallow. The foliage is largely basal and furnishes a very palatable forage early in the spring. The seeding rate alone is 20 to 25 pounds per acre.

Harding grass (Phalaris tuberosa var. stenoptera) is a long-lived, large tufted perennial. It is best adapted to heavy, well-drained, fairly moist soils. Harding grass is somewhat difficult to establish as it reseeds very poorly and spreads slowly from its large root clumps. It produces under favorable conditions, however, abundant forage of excellent palatability, and when once established is quite persistent. Seedings of Harding grass in Sonoma County indicate an excellent cover and high carrying capacity when seeded alone, broadcast or in two-foot rows. The high palatability of this grass suggests its use in mixtures to improve the quality of the forage. Seeding alone, 6 to 8 pounds per acre should be used, and in mixtures, 2 to 3 pounds per acre.

The grass seedings of all pasture lands should be supplemented with a low-growing legume, such as Bur clover of alfalfa. These legumes tend to aid the growth of grasses and improve the palatability of the forage.

On the north or east slopes where the soil consists of a clay loam or sandy loam type, Western rye grass, Orchard grass, Meadow fescue, Redtop, Harding grass and crested wheat grass may be selected for seeding. On exposed west and south slopes, where erosion has been more active, English rye grass, Western rye grass, crested wheat grass, and Smooth brome grass may be used alone or in mixtures. A mixture is usually preferable since the total cost of seed per acre will be less and the quality and palatability of the forage is improved. A combination of the most desirable grasses will lessen the uncertainty in developing a grass cover, thereby affording greater protection from erosion, and will increase the total forage and length of grazing period.

More information is needed in regard to the proper quantities of each kind of seed to use in mixtures. When the more expensive and long-lived species, such as Harding grass and crested wheat grass, are used in mixtures with Western rye grass, a good plan is to use one-half the amount by weight ordinarily used when one of the two former species is sown singly, together with three-fourths of the amount of Western rye grass when sown by itself. When plants with similar growth habits, such as Orchard grass and meadow fescue, are sown together, one-half the amounts recommended for each when

sown alone should be used. If plants with small, heavy seed are to be used in combination with species having large, lighter seed, it is more advisable to broadcast each kind of seed separately in order to get a well-mixed uniform stand.

Another method of determining quantities of each kind of seed to use in mixtures where several species are to be included is to consider the percentage of cover desired of each species. The total quantity of seed per acre is usually from 25 to 60 pounds. Representing the total mixture as 100 percent, next decide as to the predominating species desired; thirty to fifty percent of one species or one-half this percentage each of two or more species which are to be the predominating plants. The predominating plants should be long-lived, and either of a bunch or sod-forming type. Long-lived perennials are usually slow in becoming established, therefore, 20 to 25 per cent of the mixture should consist of an early, rapid, low-growing, short-lived perennial, such as Western rye grass. A low-growing annual or perennial legume of good seed habit, such as bur clover or alfalfa, should make up from 8 to 15 percent of the mixture to improve the quality and palatability of the forage. The balance of the mixture may be made up of other desirable species, either annuals or perennials, to hasten coverage and permit earlier grazing. It is very desirable to use in addition to the complete mixture 10 to 15 pounds of an early maturing cereal variety, such as barley or oats. On heavy soils a combination of 14 pounds Orchard grass, 9 pounds Western rye grass, 3 pounds Meadow fescue, 4 pounds crested wheat grass, and 5 pounds Bur clover may be sown at 35 pounds per acre. For drier slopes a combination of 8 pounds crested wheat grass, 7 pounds Smooth brome, 9 pounds English rye grass, and 5 pounds Bur clover may be sown at the rate of 29 pounds per acre.

Supplemental summer crops, necessary to furnish green feed for the stock while the reseeded pastures are being established, should be grown. Such crops as Sudan grass, sorghum and various summer legumes are suitable. These crops, their culture, value and use can well be discussed in a later article.

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